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3. METHODS

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of their critical habitat. The USACE must consult with the NMFS and USFWS regarding the effects of the Willamette Project on listed species. The NMFS and USFWS will evaluate the effects of the Willamette Project and issue a Biological Opinion that determines, based on the best scientific and commercial data available, whether the Willamette Project is likely to jeopardize the continued existence of listed species, or destroy or adversely modify the designated critical habitat of listed species. The NMFS and USFWS will review this Biological Assessment together with available data and information as they write their Biological Opinion. An important goal of this document was therefore to present information in a format and manner that would be useful to the NMFS and USFWS.

In accordance with Section 7(c) of the ESA, the preparation of this BA included: a review of literature and scientific data; interviews and consultation with experts; review and analysis of the potential effects of the proposed action on the species and its habitat; and review and analysis of alternatives and conservation measures. However, due to the magnitude of the overall project area and the number of species addressed, on-site field surveys and inspections of the project area were not undertaken. Instead, existing information and data (including survey results) and consultation with experts and USACE field staff were used to identify specific locations and analyze the potential effects to the species.

There were five basic steps taken in the analysis. The first step was to define the action area and the scope of the action. This was done in Chapters 1 and 2. Definition of the action area involved consideration of boundaries relevant to the aquatic and terrestrial species. For the aquatic environs, a watershed or sub-basin geographic unit (and its downstream environs) is usually a logical action area designation. Most habitat effects are carried downstream readily, and many can occur upstream as well. Moreover, watershed divides provide clear boundaries for analyzing the cumulative effects of multiple independent actions.

The second step was to describe the affected species= status and define its biological requirements. This included identifying listed species and populations that are potentially influenced by the proposed action. Under the ESA, a taxonomic species may be defined as a

Adistinct population segment.≅ The NMFS has established a policy that describes such Adistinct population segments≅ as ESUs. An ESU is a population or group of populations that is substantially reproductively isolated from other populations of the same species and represents an important component in the evolutionary legacy of the species. In implementing the ESA, the NMFS has established ESUs as the listing unit for salmon species under its jurisdiction, whereas the USFWS has selected distinct population segments to be the appropriate listing unit.

Chapter 4 was written to present information on the biological requirements and characteristics of each species, ESU, or DPS identified in Chapter 1 as being of concern. Where possible, the descriptions include parameters of abundance and distribution, and their trends. Various sources of information were reviewed to define species and population status, including species status reviews and a number of stock summaries that have been prepared over the years. As much relevant information as possible is presented. No new, extensive analyses were performed, however, and the information presented was restricted to readily available data and reports. The reports were evaluated with respect to whether the analyses and conclusions were reasonable, but could not be evaluated for their veracity or ability to meet scientific standards of proof. Data could not be reviewed for their accuracy or whether appropriate measurement techniques had been used. This Biological Assessment assumes that the available information is correct, with the exception of selected contradictory data or reports that required resolution; in those instances, the information is evaluated for plausibility. The amount of information available varies with species; the best available, most relevant information is summarized here.

Chapter 4 also describes each affected species= biological requirements and life history information. However, rather than repeat general information common to each species throughout its range, this document reports information that is either specific to the action area, or pertains to the most significant effects of the Willamette Project. References are provided for general life history information sources. Selected biological requirements are also presented in Chapter 6 when appropriate to the analysis of effects (e.g., instream flows, water quality criteria).

The third step was to identify and describe the environmental baseline in the action area relative to listed species= current status. The environmental baseline represents the current basal set of conditions to which the effects of the proposed or continuing action would be added. Section 7 of the ESA defines the environmental baseline as “the past and present impacts of all federal, state, or private actions and other human activities in the action area.” It Aincludes the past and present impacts of all federal, state, or private activities in the action area, the anticipated

impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process" (50 CFR 402.02).

The environmental baseline does not include any future discretionary federal activities (that have not yet undergone ESA consultation) in the action area. The species= current status is described in relation to the risks presented by the continuing effects of all previous actions and resource commitments that are not subject to further exercise of federal discretion. For an ongoing federal action such as the Willamette Project, those effects of the action resulting from past unalterable resource commitments are included in the baseline, and those effects that would be caused by the continuance of the proposed action are then analyzed for determination of effects. The environmental baseline encompasses the historic and present conditions, as well as the progression of these conditions from the past to the present (Smith 1999b).

Chapter 5 describes the corresponding environmental baseline for the Willamette Project and provides context for evaluating the effects of the Willamette Project on listed species that are found within the project area. Information is presented when available that describes the environmental conditions of the aquatic and terrestrial ecosystem both prior to the construction of the 13 USACE Willamette River basin dams, and under current operating conditions. The chapter is organized by major subbasin, including the mainstem Willamette River, the Santiam River and its two major forks, the McKenzie River, the Middle Fork Willamette River, the Coast Fork Willamette River, and the Long Tom River. Baseline is described for each subbasin in terms of physical processes and the resulting observed habitat conditions and species distributions. As for Chapter 4, available information was reviewed, and the most salient and relevant details are presented here. The same assumptions regarding accuracy and correctness of conclusions as described above for Chapter 4 were applied to the baseline information.

The fourth and most critical step was to determine the effects of the Willamette Project on listed species. For an action the scale and scope of the Willamette Project, this is not an easy thing to do because of the numerous ways that both the project and other actions may influence listed species. In this step of the analysis, the Biological Assessment examines the likely effects of the proposed action on individual and groups of species and their habitat, within the context of current status, existing environmental baseline, and similarity of life history attributes and biological requirements.

In general, it has not been estimated previously how many listed organisms will be killed or injured ("take") because of the Willamette Project during a particular life history stage, and what the effects of that take=s effects on population size and viability would be. Instead, many effects of the Willamette Project are determined in terms of changes to each species' or group of species' habitat conditions, and how those changes are related to habitat requirements. This technique is used because, while many cause and effect relationships between habitat quality and population viability are well known, they do not lend themselves to meaningful quantification of effects in terms of numbers of individual organisms. It is often difficult to quantify the effects of a given habitat action in terms of its impact on biological requirements for individual salmon (whether in the action area or outside of it). Given the current state of the science, usually the best that can be done is to determine the effects an action has on a given habitat component and, since there is a direct relationship between habitat condition and population viability, extrapolate to the impacts on the species as a whole. Consequently, this technique indirectly assesses the effects of actions on population condition by evaluating whether existing habitat conditions and changes to those conditions would be conducive to each species' conservation. For example, when a species= status is poor and the baseline is degraded at the time of consultation, it is more likely that any additional adverse effects caused by the proposed or continuing action will be significant. The relative significance of the effects of the action upon the species' likelihood of survival and chances for recovery can then be understood better.

The analysis also evaluates as best possible both direct and indirect effects of the action. AIndirect effects≅ are those that are caused by the action and are later in time but are still reasonably certain to occur. They include effects on species or critical habitat of future activities that are induced by the action subject to consultation and that occur after the action is completed. The analysis also takes into account direct and indirect effects of actions that are interrelated or interdependent with the proposed action. AInterrelated actions≅ are those that are part of a larger action and depend on the larger action for their justification. AInterdependent actions≅ are those that have no independent utility apart from the action under consideration.

Chapter 6 presents the effects analysis. The analysis evaluates effects of individual projects and of the system as a whole, and when appropriate uses historic effects as a guide for identifying likely present effects. Effects on ESA-listed fish and critical habitat are addressed with respect to different categories of effects. Specific analyses methods are described where appropriate in the chapter.

The fifth step was to consider cumulative effects in the action area. Implementing regulations for the ESA define "cumulative effects" as those effects caused by future projects and activities unrelated to the action under consideration (not including discretionary federal actions) that are reasonably certain to occur within the action area (50 CFR 402.02). Since all future discretionary federal actions will at some point be subject to consultation under Section 7 of the ESA, their effects will be considered at that time and are not included in the present assessment of cumulative effects. However, because of the size of the action area and the large number and wide variety of non-federal activities that have occurred and will occur, it is beyond the scope of this Biological Assessment to identify specific cumulative effects. Chapter 7 consequently identifies cumulative effects in terms of general activities known to occur within each major subbasin of the Willamette system.